

EEB 4275 (Invertebrate Zoology)

Fall, 2012

REVISED Study Guide 2

For each phylum, in addition to the information listed below, you should know the common name, habitat (e.g. freeliving/parasitic; marine, terrestrial, freshwater), and position within the general scheme of “invertebrate” organization with respect to the major groupings of “invertebrates” i.e. acoelomate vs. blastocoelomate vs. eucoelomate; bilateria vs. radiata; protostome vs. deuterostome; level of organization: cell, tissue, organ system etc.; you should have some idea of the total diversity of each phylum. You should also be able to describe how each phylum generally handles locomotion, respiration, circulation, excretion, food acquisition, digestion, reproduction, osmoregulation, development, defense, sensory perception and larval stages (if any). You should know the distinguishing characteristics, and diversity of the Classes (if covered) and Subclasses (if covered) of each of the larger phyla.

Eucoelomates: what is a eucoelom? 2 main types (i.e., protostomes and deuterostomes) and 5 ways they differ (e.g. spiral vs. radial cleavage, etc); be able to diagram the embryonic formation of a schizocoelom and an enterocoelom, in each case illustrating the position of the three embryonic germ layers.

Mollusca- distinguishing characteristics of phylum and its 7 classes and approximate diversity; candidate synapomorphies of the phylum and their issues; know the layers of the shell and their composition; mantle- what is it? Where is it? understand which cavities represent true eucoelom; embryonic origin of the haemocoel; morphology and components of the digestive system (including odontophore structure and its distribution among the 7 classes); nervous system- nerve cords, paired ganglia and the portions of the body they each innervate; structure and function of a metanephridium; respiration and basic ctenidial structure, osphradium and its function; basic circulation and the relationship between the vessels, haemocoel and gills; reproduction, molluscan life-cycle stages (trochophore, veliger, etc.) and their presence among mollusc classes; Cl. Scaphopoda- general features; Cl. Polyplacophora- characteristics (which structures are repeated?); Cl. Bivalvia- general characteristics, body plan compared to the basic molluscan body plan; water movement, food acquisition; gill structure vs. feeding in Anomalodesmata, Protobranchia, and Lamellibranchia; Cl. Aplacophora- characteristics; Cl. Monoplacophora- distinguishing features (which structures are repeated?); Cl. Cephalopoda- general characteristics, body plan compared to the basic molluscan body plan; functional vs. anatomical orientation of cephalopod body; general characteristics (circulation, respiration, prey capture, etc.) of 2 extant cephalopod subclasses (i.e., Nautiloidea and Coleoidea), shell in each, buoyancy compensation and/or movement in each (differences among squid vs. cuttlefish vs. octopus). Cl. Gastropoda- 3 main stages in torsion (ventral flexure, contraction, etc.); know how the contorted body plan compares to that of the basic un-torted molluscan body plan (i.e. morphological consequences of torsion), advantages?; terms associated with various configurations of shells (dextral, planospiral, etc.); 3 gastropod subclasses and their distinguishing characteristics (i.e. Prosobranchia, Opisthobranchia, Pulmonata); configuration of respiratory organs in each. Interesting associations between mollusks and other organisms (e.g. in blue ringed octopus, deep sea bivalves, shipworms, etc.).

Annelida- differences between annelid and mollusk body cavity; body cavity and its functions (site for accumulation of waste, hydrostatic skeleton, etc.); difference between a true segment and a proglottid; what is metamerism and how does it compare with strobilization in the tapeworms? Three main body regions of annelids (prostomium, etc.). Describe serial homology, tagmatization (be able to provide an example in annelids, e.g. *Chaetopterus*). What is homonymy? Heteronymy? Provide an example of each. Distinction between errant and sedentary polychaetes. Distinguishing characteristics of phylum; musculature; nervous system; respiration; excretion (metanephridia and segments they drain); circulation; reproduction; digestion/feeding- correlation with body form, specialization of gut; differences between Classes; Class Polychaeta- general characteristics; diversity; parapodial structure in *Nereis* (notopodium vs neuropodium structure and function, etc.); feeding modes- explain an example of each mode (i.e., filter feeding, selective deposit feeding etc.); respiration- various modes: body surface, various types of parapodial and non-parapodial “gills”, examples of each; circulatory system; excretion; development; reproduction- what is epitoky? Two types of epitoky (direct transformation, multiple outgrowths). Pololo worm? Family Pogonophoridae- distinguishing characteristics; general morphology; diversity; 4 major body regions; symbiotic relationship with bacteria (in trophosome) as source of carbon for life; problems with determining embryonic origin of body cavity. Cl. Clitellata- general characteristics, monophyletic? Subclass Oligochaeta- monophyletic? respiration, reproduction, distinguish between copulation and fertilization, parapodia? Setae? Subclass Hirudinoidea- monophyletic? general characteristics, parapodia? Setae? General life style.

Echiura- distinguishing characteristics; general features; evidence of segmentation? diversity; life cycle and sex determination in bonellids; true affinities?

Sipuncula- distinguishing characteristics; general characteristics; evidence of segmentation? Urns and their function; diversity; true affinities?

Arthropoda- general and distinguishing characteristics, segment formation; tagmatization, understand concept of serial homology and be able to illustrate it in arthropods, distinguish homonymy from heteronymy; articulated exoskeleton and its features, ecdysis; morphology (articles/podites) of typical biramous arthropod appendage (jointed, etc.); distinguish a

uniramous from a biramous appendage (exopodite vs. endopodite); provide an example of a group with each; details of the following arthropod systems: musculature; body cavity (mixocoel- what is it?); circulatory system; respiration (compare respiratory structures of terrestrial vs. aquatic arthropods); excretion/osmoregulation (nephridia and malpighian tubules); digestive system; nervous system; reproduction and development; appendages, etc. 4 Subphyla covered and their approx. diversity, (extant vs. extinct) and general membership. **Trilobitomorpha**: general features, distinguishing features, issue with uni- vs. biramous, approx diversity. **Crustacea**: general features, distinguishing features, development (nauplius larva), major body divisions and appendages of each, approx. diversity; for each of 3 Classes covered: distinguishing features, basic features, constituent Orders/Subclasses and their basic features and habitats: (3 for Branchiopoda; 4 for Malacostraca; 5 for Maxillopoda). **Myriapoda**: general features, distinguishing features, approx. diversity; for each of 4 Classes covered: basic features, distinguishing features, habitat. **Cheliceriformes**: general features, distinguishing features; 2 Classes; 2 Subclasses of Chelicerata; 2 Orders of Merostomata, basic features, habitat of each.

Be able to define and, if relevant, describe the function of each of the following terms:

protostome		schizocoely
neuropodium	cephalic lobe	trunk
ecdysis	megalops	nephrostome
biramous	spiracle	pedipalp
cephalothorax	ctenidium	clitellum
enterocoely	operculum	nephridiopore
segment	tagmatization	metamerism
article	exhalent siphon	dextral shell
cephalization	inhalent siphon	schizocoel
chelate	torsion	epipodite
notopodium	pleiopod	homonomous
pereopod	metanephridium	tagmata
enterocoel	maxilliped	glochidium larva
antenna	antennule	coxa
mandible	uniramous	mixocoel
triploblastic	cephalized	siphuncle
archenteron	exopodite	pleopod
cuttlebone	eucoelom	gastric shield
urns	chitin	detorsion
hemocoel	crystalline style	naupliar eye
planospiral shell	bipectinate ctenidium	unipectinate ctenidium
prostomium	nauplius	trochophore
veliger	open circulatory system	endopodite
typhlosole	foot	prismatic layer
periostracum	nacreous layer	chelicera
uropod	telson	gnathopod
seta(e)	blastocoel	osphradium
aciculum	serial homology	cuttlebone
radula	odontophore	ink sac
prosoma	peristomium	mantle cavity
mantle	maxillule	maxilla
teloblastic growth	pygidium	buccal mass
heteronomous	copulation	epitoke
chromatophore	fertilization	pneumostome
spermatophore	malpighian tubule	chiliped
blastula	diplosegment	gastrula
errant	parapodium	umbo
sedentary	opisthosoma	beak
visceral mass	sinistral shell	